The Role of Trait and State Acceptance as Moderators of Affective Stress Reactivity in Daily Life: An Experience Sampling Method Study

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Abstract

Background In research, acceptance was consistently depicted as an adaptive emotion regulation (ER) strategy across different contexts in cross-sectional and longitudinal study designs. However, an emerging paradigm considers ER context-dependent; thus, a flexible use of ER strategies appears more critical than a putatively adaptive set of strategies. To test differences between a variable and trait-like use of acceptance, this study aims to investigate to what extent the strategy of acceptance moderates the relationship of stressful events and negative affect using the experience sampling methodology.

Method Participants (N=67, M age $= 29.04$, 53.7% female) received daily questionnaires ten times a day for a week, including questions about momentary stressful events, state negative affect and state acceptance. To test the moderation effects, linear mixed-effect models were applied. Additionally, intraindividual fluctuations of participants high and low in trait acceptance were investigated.

Results Analyses revealed that state acceptance was a significant moderator of momentary stressful events and state negative affect within persons ($p<.001$). Trait acceptance was not associated with momentary stressful events and state negative affect ($p=.96$)

Conclusion The current study discovered a significant within-person association between momentary stressful events and state negative affect moderated by state acceptance. In contrast, trait acceptance was not found to moderate this relationship. This evidence points to the importance of within-strategy variability and context-dependency in ER.

Introduction

Stressful hassles, such as exams, or an argument with a friend, exert an impact on many people. For most of society, dealing with these daily stressors constitutes a challenge. Some individuals struggle more, while others possess prerequisites enabling them to deal well with demanding situations. As general mental health is highly dependent on being able to regulate emotions connected to daily stressors, the interplay between ER strategies, stress, and levels of negative emotional states becomes an essential focus of study (e.g., Aldao et al., 2010). Investigating these dynamics can disclose critical information which aids in implementing policies that enhance public mental health through treatments or interventions.

Mental Health & Stress

To what extent an individual develops a mental illness can be promoted by manifold factors. Notably, biological predispositions, childhood experiences, and external factors such as adverse life events or daily stress are significant predictors of mental illness (Center for Disease Control and Prevention (CDC), 2021). The experience of stress can broadly be distinguished depending on whether it is brought on by major adverse life events (e.g., the loss of a loved one) or by daily stressors. These minor stressors, also called life hassles, are "the little things that can irritate and distress people" (Lazarus & Folkman, 1984, p. 13), such as getting trapped in traffic while rushing late for a meeting.

While growing evidence suggests temporary stress to entail motivating features (Grünenwald et al., 2022; Keech et al. 2021), accumulated stress nevertheless was found to be associated with symptoms of mental illnesses (D'Angelo & Wierzbicki, 2003; Parrish et al., 2011) and impairs abilities such as flexibility or functioning in social roles (Galderisi et al., 2015). A factor facilitating these outcomes is that stress sensitises the stress system eliciting more intense reactions to stressors (Bale, 2006). This individual stress response is called stress reactivity and was found to be a significant factor in developing mental illness (Parrish et al., 2011; Schlotz, 2012). Being able to deal with daily stress frequently is, therefore, a prerequisite to avoiding the detrimental effects of accumulated stress.

Stress & Emotion Regulation

ER is crucial in daily functioning and protecting oneself from stressful events. The broad concept of ER can be understood as "processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions" (Gross, 1998, p. 275). In stressful situations, ER constitutes a mechanism allowing individuals to assess the emotional effects of the situation, choose appropriate responses to the stressor, and when and how to react (Wang & Saudino, 2011). The degree of affectedness depends not on the

stressor frequency but on the individual's affective reactivity (i.e., how an individual generally reacts to stressors) (Sin et al., 2015). ER appears to play a crucial role in buffering the adverse effects of stress (Richardson, 2017), in other words positively impacts negative affective reactivity when confronted with stressors in everyday life.

Emotion Regulation Strategies

The literature on the conceptualisation of ER strategies yields mixed approaches. Generally, the ability to emotionally regulate involves a manifold variety of strategies (e.g., Kraiss et al., 2020; Garnefski et al., 2001; Garnefski & Kraaij, 2006). A large body of research considers strategies such as reappraisal or acceptance as more adaptive (Aldao et al., 2010), while engaging in maladaptive ER strategies is associated with various mental illnesses (Amstadter, 2008; Campbell-Sills et al., 2014; Richardson, 2017). For example, major depressive disorder is characterised by dysfunctional ER, such as rumination, impacting individuals' well-being (Joormann & Quinn, 2014; Joormann & Stanton, 2016; Park et al., 2019). However, newer research shows that the extent to which ER strategies are adaptive is highly context-dependent (Blanke et al., 2020). This ability to adapt one's ER strategies in response to changing circumstances or contextual demands such as stress is called ER flexibility and is associated with general mental health (e.g., Aldao et al., 2015; Aldao & Nolen-Hoeksema, 2012; Bonanno & Burton, 2013) as well as less negative affect in daily life (Blanke et al., 2020; Brockmann et al., 2016). While there is no framework connecting these approaches of ER (Sanchez-Lopez, 2021), it can nevertheless be concluded that the type of context is imperative in selecting an appropriate ER strategy.

Acceptance

One putatively adaptive ER strategy is acceptance. It is defined as the "thoughts of accepting what you have experienced and resigning yourself to what has happened" (Garnefski et al., 2001, p. 1314). Compared to other strategies, acceptance is thus not based on modifying a specific emotional state (such as reappraisal) but rather on taking in emotions as they come without exerting control over them (Hayes, 2004; Gross, 2015). Acceptance can prove advantageous in the context of stressful situations when a stressor cannot be changed or solved (Gratz & Tull, 2010). In clinical contexts, many acceptance-based approaches were proven effective in decreasing anxiety, depression, and stress symptoms (Segal et al., 2002; Hayes et al., 2006; Twohig & Levin, 2017). As an ER strategy in everyday life, acceptance is related to decreasing negative and eliciting positive affect in clinical and non-clinical groups, including the context of stress (Kraiss et al., 2020; Shallcross et al., 2010). However, when an

individual uses a strategy depends on momentary use but also a general tendency towards an ER strategy.

Trait & State Emotion Regulation

Regarding ER strategies such as acceptance, research focuses increasingly on the distinction between state and trait modes of such constructs. Trait measures of ER use disclose information about the individual's general tendency to use specific ER strategies, while state measures enable the researcher to examine an individual's variability in ER strategies across time, referred to as within-strategy variability (Aldao et al., 2015; Curran & Bauer, 2011; Geiser et al., 2017). Considering that regulating emotions is highly context-dependent (e.g. Aldao et al., 2015; Bonanno & Burton, 2013), the variable use of state acceptance in moments of stressful experiences is possibly more effective in buffering affective reactivity in daily life than purely a general tendency to deploy acceptance.

Stress, Negative Affect & Emotion Regulation

Research revealed the importance of state ER strategies (i.e., the variable use) as protective factors in contexts of stressful events and negative affect. Existing research on the ER strategy of state acceptance supports its effectiveness in alleviating negative affect and symptoms of stress, especially in clinical populations (e.g., Shallcross et al., 2010; Tschacher & Lienhard, 2021). The importance of such protective effects of state ER strategies for affective recovery is exemplified in several studies (e.g., Kuranova et al., 2020; De Calheiros Velozo et al., 2023). In the experience sampling method (ESM) study by Kuranova et al. (2020), it is suggested that individuals whose symptoms of mental illness worsened within one year were slower to recover from negative affect after unpleasant events than individuals with stable symptoms. However, there is currently no evidence investigating the effects of both trait and state acceptance as ER strategies in the context of affective stress reactivity in everyday life.

Experience Sampling Method

To measure momentary constructs such as state acceptance and examine its dynamics in different contexts of daily life, the Experience Sampling Method (ESM) proves advantageous (e.g., Kuranova et al., 2020; Shallcross et al., 2010; Tschacher & Lienhard, 2021). ESM is a form of ecological momentary assessment for gathering data in people's daily lives, including its context and content. Consequently, potential connections between different contexts (e.g., everyday life) and the emotional processes (e.g., acceptance at different moments) within individuals can be drawn (Hektner et al., 2007), allowing for more ecologically valid data to be collected (Hiekkaranta et al., 2021). In contrast to between-person associations, ESM has the inherent advantage of preventing recall bias (Napa Scollon et al., 2009). This method, therefore,

allows us to measure to what extent the individual's trait and state acceptance in daily life buffer affective stress reactivity as a result of ER.

The Current Study

There is currently no evidence comparing these two levels of acceptance in daily stressful situations, so the current study aims to close this research gap. Considering the risks of affective stress reactivity, investigating the interplay of (trait and state) acceptance, stressful events, and negative affect becomes crucial. Thus, based on the importance of context in ER strategies (e.g., Aldao et al., 2015; Bonanno & Burton, 2013; Aldao & Nolen-Hoeksema, 2012), I hypothesise that the use of state acceptance moderates the relationship between momentary stressful events and state negative effect, while trait acceptance does not moderate this relationship. To investigate the influence of trait and state acceptance as moderators on daily stress and negative affect, the following research question (RQ) was derived "To what extent do trait and state acceptance moderate the relationship between momentary stressful events and state negative affect?". Accordingly, I hypothesised in H1 that "State acceptance moderates the relationship between momentary stressful events and state negative affect" (see Figure 1). Furthermore, I hypothesised in H2 that "Trait acceptance does not moderate the relationship between momentary stressful events and state negative affect" (see Figure 2).

Figure 1

The Hypothesised Moderation Effect of State Acceptance on The Relationship of Momentary Stressful Events and State Negative Affect (H1)
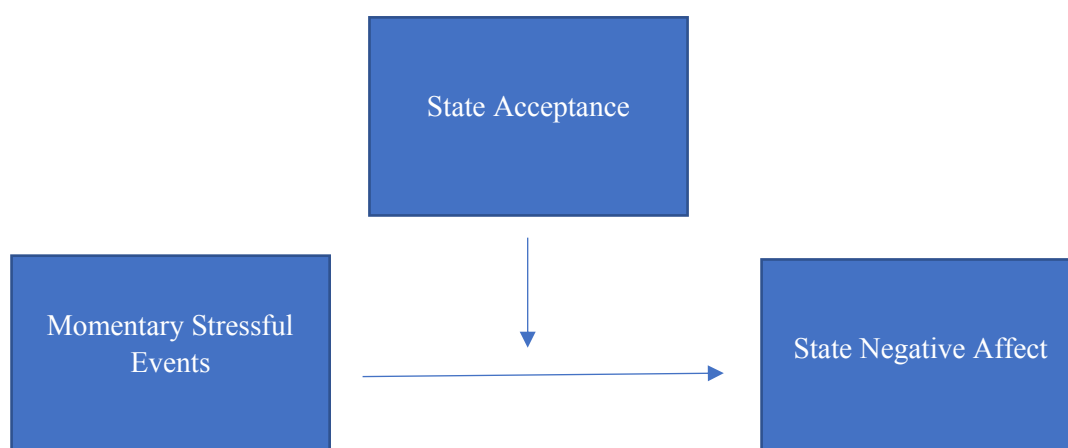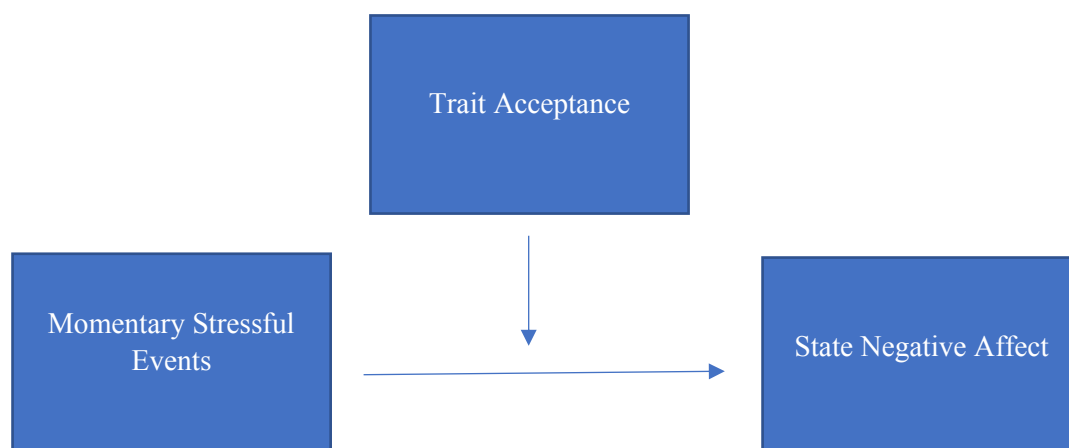
Figure 2

The Hypothesised Moderation Effect of Trait Acceptance on The Relationship between Momentary Stressful Events and State Negative Affect (H2)

Methods

Participants

Individuals were recruited from the region of Enschede (NL) and multiple regions in Germany using convenience and snowball sampling. The research team disseminated the study via their social media and encouraged those reached to further share it. While these types of non-probably sampling have various disadvantages (e.g., low generalisability), it also offers advantages such as a higher willingness to participate (Galloway, 2005; Jager et al., 2017). Additional participants were recruited through the SONA-systems application by the University of Twente, where undergraduate students collect credits for their study. Another incentive involved a 40€ voucher for an online shop given to a randomly selected participant. Inclusion criteria for participants required a minimum age of 18 years, sufficient English skills, and smartphone ownership to complete the study. A sample size of at least 50 was aimed, which is standard practice in ESM research (van Berkel et al., 2018). While 128 participants were approached in the sample, the final sample consisted of 67 participants (52.34%).

Measures

The data collection measured various constructs related to mental health and ER (see Appendix A). Measuring individuals' states was done using items from the ESM item repository (see Appendix B), contributing to a collection of items designed for ESM studies. While a long-term goal is validating these items, attempts have already been made to validate some (e.g., Cloos et al.,

2023). Next to the mentioned constructs demographical data such as age, gender, and nationality were assessed.

Trait Acceptance

Trait acceptance was assessed by calculating each individual's average state acceptance scores (Kirtley et al., 2020), as it benefits from capturing the participants' fluctuations throughout the study period (Blanke et al., 2020; Napa Scollon et al., 2009). The statement was rated on a 7-point Likert scale from 1 (*not at all*) to 7 (*very much*). This measurement was not significantly correlated with the Cognitive Emotion Regulation Questionnaire (CERQ-short) acceptance subscale (Garnefski & Kraaij, 2006). $r(65)=.007, p=.94$, which calls into question the convergent validity.

State Acceptance

To measure acceptance in daily life, a one-item state measure was derived from a 4-item scale assessing psychological flexibility (Kirtley et al., 2020). The participant rated the statement on a 7-point Likert scale from 1 (*not at all*) to 7 (*very much*). Regarding reliability, a good split-half reliability coefficient of 0.81 was found (see Brown, 1910; Spearman, 1910).

State Negative Affect

To measure *state negative affect*, five items from the ESM item repository were adapted to be used (Kirtley et al., 2020). Statement items such as "I feel irritated" were rephrased into questions such as "How irritable do you feel right now?". These items were rated on a 7-point Likert scale from 1 (*not at all*) to 7 (*very much*). A split-half reliability coefficient of 0.79 indicated good reliability (see Brown, 1910; Spearman, 1910).

Momentary Stressful Events

To measure *momentary stressful events* during the day, a one-item state measure was used from the ESM item repository (Kirtley et al., 2020). The item *Think of the most striking event or activity in the last hour. How (un)pleasant was this event or activity?* was rated on a semantic differential scale from -3 (*very unpleasant*) to +3 (*very pleasant*).

Design & Procedure

The data were collected in several waves, with the first wave from the 7th to the 13th of November 2022 and the second wave from the 13th to the 19th of February 2023. The current study's data were part of the third wave, starting on the 17th of April 2023 and ending on the 24th of April 2023. Ethical approval was obtained by the Ethics Committee of Behavioural, Management, and Social Sciences of the University of Twente (IRB Approval Code Nr. 230038). Five days before the start of the study, participants received information about the study procedure via E-Mail (including a participation code). Based on the participation code, participants were randomised into two groups, which was a procedural part of another data collection. Participants were not informed

about this masking. This study only used the dataset, which included only participants from the "Likert" condition. As a next step, participants were asked to download the Ethica app (https://ethicadata.com/) on their smartphones, register, and sign up with the participation code. After signing up, they were led to the informed consent form to which they had to agree before gaining access to the baseline and state questionnaires (see Appendix C).

When the study enrolled, respondents were asked to fill out a one-time baseline questionnaire and multiple state questionnaires asking for momentary states on each of 7 consecutive days. The baseline questionnaire was triggered once and accessible throughout the whole data collection. It took about 15-20 minutes to complete, and reminders for completion were sent after 8, 24 and 72 hours. The state questionnaires were prompted at ten moments per day. This frequency was chosen as it captures a wide range of intraindividual fluctuations in daily life. Completing one of the questionnaires took approximately 2 minutes. To ensure that time was evenly sampled throughout the day, a semi-random sampling schedule notified the participant randomly within ten predefined time intervals from 7:30 until 22:30 in blocks of 90 minutes throughout the day for a week. One advantage of this method is its high ecological validity due to its unpredictability, as participants cannot anticipate when the questionnaires will be prompted (Dejonckheere & Erbas, 2021). Per state questionnaire, participants received one notification without a reminder on their smartphones which would expire after 15 minutes if they were not completed in the allotted period.

Data Analysis

After the dataset was downloaded from the Ethica website, the data were corrected and analysed using the open-source program R-4.3.1. with the interface R Studio (Posit team, 2023). Respondents who completed less than 30% of the daily questionnaires were excluded, and rows with out-of-range data (e.g., dates not in the appropriate format) were filtered out. The variable momentary stressful events was dichotomised (scores from -3 till -1 = "stressful"; from 0 till 3 = "non-stressful"). For the variables state acceptance and state negative affect, person-mean scores were calculated. Additional person-mean centered scores were calculated for state acceptance to observe the intra-individual deviations of state acceptance use (Curran & Bauer, 2011).

To test the hypotheses, linear mixed-effect models (LMEs) using a restricted maximum likelihood estimation (REML) and a random intercept model were chosen to account for the nested structure of multilevel data and missing values (Myin-Germeys et al., 2018). For H1, an LME was used to test a possible moderation effect between momentary stressful events (IV) and state negative affect (DV), including an interaction effect between momentary stressful events and state acceptance. To test H2, another LME between momentary stressful events (IV)

and state negative affect (DV) was applied, testing the moderation effect of trait acceptance. To conduct an LME and compute the according regression tables, the lme4 (Bates et al., 2015) and lmerTest (Kuznetsova, 2017) packages were used, respectively.

Four individuals with low or high trait acceptance were chosen to investigate intraindividual fluctuations of the variables. Trait acceptance scores were categorised into low trait acceptance (scores 1-4) and high trait acceptance individuals (scores 4-7), whilst individuals with a cut-off score of 4 were not considered. To plot the within-person fluctuations in R, the ESMvis tool was used (Bringmann et al., 2020).

Results

Descriptive Statistics

The total sample consisted of *N*= 67 individuals. It was evenly constituted regarding gender and age, composed of 31 female (53.7%) and 36 male participants (46.3%) with ages ranging from 20 to 62 years (*M* = 29.04, *SD* = 12.72). Moreover, the sample consisted of German respondents (92.5%), while the rest had Dutch (4.5%) and Other (3.0%) nationalities. More specifics regarding the characteristics of the sample can be found in Table 1.

The sample's general mental health was assessed using several self-report measures (see Keyes, 2002; Kroenke et al., 2001; Lamers et al., 2010; Spitzer et al., 2006). The scores on the GAD-7 are high compared to a general population sample from Germany (Löwe et al., 2008), indicating mild anxiety symptoms. Scores on the MHC-SF indicate a slightly lower well-being score compared to a non-clinical Dutch adult sample (Lamers et al., 2010) which is in line with higher scores on the PHQ-9 compared to a non-clinical sample from the USA (Thibodeau & Asmundson, 2013). This sample scores slightly above the cut-off score of 5, thus exhibiting mild symptoms of depression (see Kroenke et al., 2001). These scores insinuate that the sample scores are below average on well-being and above average on mental illness measures.

Additionally, bivariate correlations were calculated for the baseline mental health, trait acceptance and the state measures of acceptance, negative affect and stressful situations, revealing mixed results. Correlations between the PHQ-9 and GAD-7, PHQ-9 and MHC-SF, state negative affect and PHQ-9, state negative affect and state acceptance, state negative affect and momentary stressful event, and lastly, momentary stressful events and state acceptance were proven to be significant (see Table 2).

Table 1

Sample Characteristics (N=67)

Variable	Description	%	*n*
Age	20-62 years (*M*=29.04, *SD*=12.72)	-	67
Gender	Male	46.3%	31
	Female	53.7%	36
Nationality	Dutch	4.5%	3
	German	92.5%	62
	Other	3.0%	2
Occupation	Studying	43.3%	29
	Working	31.3%	21
	Self-Employed	4.5%	3
	Studying and Working	19.4%	13
	Other	1.5%	1
Educational Degree	Middle School	1.5%	1
	High School	49.3%	33
	Bachelor	31.3%	21
	Master	12.5%	8
	PhD	2.9%	2
	Other	2.9%	2

Table 2

Mean Scores, Standard Deviations and Bivariate Pearson Correlations of Baseline, Trait and State Measurements

	Variable	*M*	*SD*	1	2	3	4	5	6
1	GAD-7	6.25	0.27	-					
2	MHC-SF	2.99	0.75	-0.14	-				
3	PHQ-9	5.78	0.32	0.63**	-0.35*	-			
4	Trait Acceptance	4.03	1.17	-0.04	0.12	-0.04	-		
5	State Acceptance	4.10	1.91	-0.05	0.32	-0.18	0.45	-	
6	Momentary Stressful Events	0.20	0.40	-0.27	-0.22	-0.15	0.13	-0.14*	-
7	State Negative Affect	1.98	1.04	0.22	0.16	0.33*	-0.07	-0.31*	0.11*

*$p <.05$, **$p <.001$

State Acceptance as Moderator

Firstly, the relationship between the independent variable (IV) momentary stressful events and the dependent variable (DV) state negative affect was assessed. The results showed a significant positive association, $b = 0.59$, $t(2617) = 15.92$, $p < .001$, 95% *CI* [0.64, 0.78], indicating that momentary stressful events are positively associated with state negative affect. Considering H1, the within-person fluctuations are tested, including a possible moderation effect of *state acceptance*. The results showed a significant negative moderation effect of state acceptance and momentary stressful events, $b = -0.16$, $t(2563) = -7.087$, $p < 0.001$, 95% *CI* [-0.23, -0.13] (see Table 3). This indicates that the relationship between momentary stressful events and state negative affect was weaker for participants who reported higher levels of state acceptance in the moment. Therefore, H1 can be accepted.

Table 3

Summary of the LME (H1), Including Fixed Effects of Momentary Stressful Events (IV) and State Acceptance on State Negative Affect (DV)

						95% CI	
Parameter	*b*	*SE*	*df*	*t*	*p*	LL	UL
Intercept	1.9	0.07	93.8	26.5	<.001	1.77	2.03
Momentary Stressful Events	0.6	0.04	2587.2	15.9	<.001	0.52	0.67
State Acceptance	-0.08	0.01	2590.0	-7.8	<.001	-0.10	-0.06
State Acceptance*Momentary Stressful Events	-0.16	0.02	2590.9	-7.1	<.001	-0.23	-0.13

Note: CI=Confidence Interval; LL=Lower Limit; UL=Upper Limit

Trait Acceptance as Moderator

To test H2, a cross-level moderation of trait acceptance and momentary stressful events was tested. The results revealed a non-significant moderation effect of trait acceptance on the relationship between momentary stressful events and state negative affect, $b = 0.002$, $t(2628) = 0.06$, $p = .96$, 95% CI [-0.06, 0.06] (see Table 4). Therefore, hypothesis H2 was rejected.

Table 4

Summary of the LME (H2), Including Fixed Effects of Momentary Stressful Events (IV), State Negative Affect (DV) and the Moderation Effect of Momentary Stressful Events and Trait Acceptance

						95% CI	
Parameter	*b*	*SE*	*df*	*t*	*p*	LL	UL
Intercept	2.5	0.23	114.2	10.8	< .001	2.01	2.93
Momentary Stressful Events	0.8	0.13	2624.0	5.3	<.001	0.44	0.97
Trait Acceptance	-0.2	0.06	113.0	-2.9	0.01	-0.25	-0.03
Trait Acceptance*Momentary Stressful Events	0.002	0.03	2628.0	0.06	0.96	-0.06	0.06

Note: CI=Confidence Interval; LL=Lower Limit; UL=Upper Limit

Within-Person Analysis: Individual Fluctuations

The intraindividual fluctuations throughout the study period can be explored to investigate the dynamics of trait and state acceptance within persons.

Individuals Low in Trait Acceptance

To investigate low trait acceptance individuals, the fluctuations of participants 62680 (M= 1.86) and 67783 (M= 2.56) were examined (see Figures 1 and 2). Participant 62680 shows contradictory fluctuations. While often state negative affect is accompanied by lower state acceptance scores (see between time points 30 and 70), other times, both graphs seem to move in unison (see time points 0 till 20). The ladder illustrates a slight covariation, implying that the participant possibly used a heightened state of acceptance in moments of higher negative affect. Fluctuations of Participant 67783 depict consistent shifts of state negative affect and state acceptance. Higher scores of state negative affect are consistently associated with lower levels of state acceptance and vice versa. Interestingly, participant 67783 shows multiple outliers of state acceptance compared to their trait acceptance score. Comparing this with Participant 62680, this indicates an increased use of the state acceptance strategy, which suggests that some individuals may apply this strategy more intensely to achieve similar effects.

Figure 1

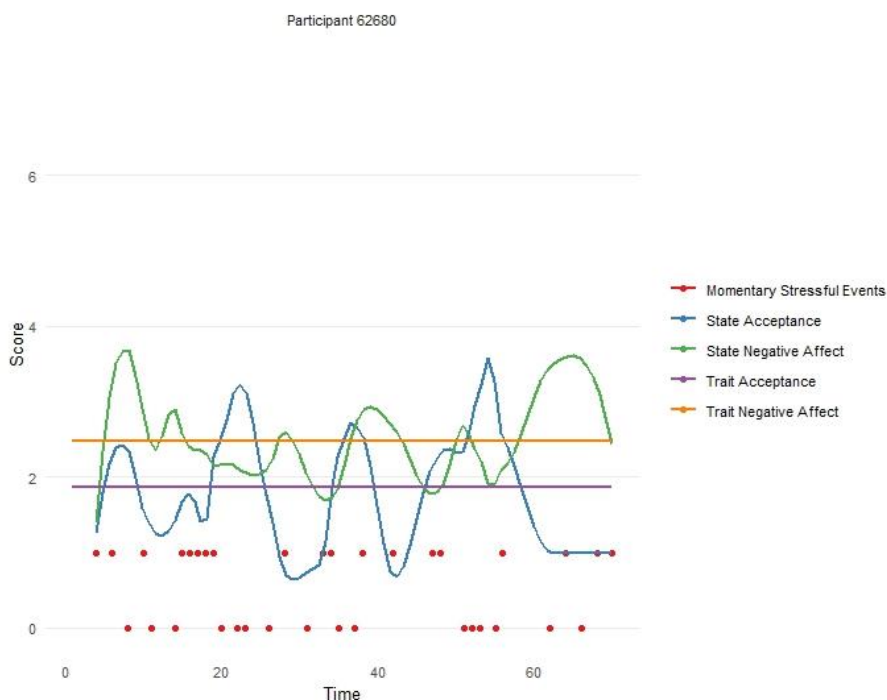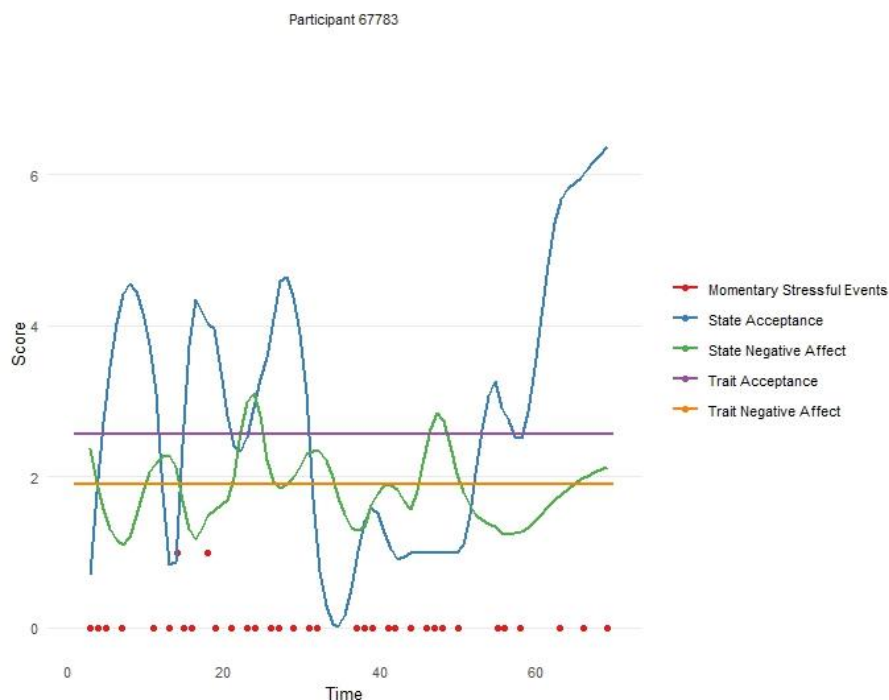*Line Plot Visualising Participant 62680 (Low Trait Acceptance Individual)*

Figure 2

Line Plot Visualising Participant 67783 (Low Trait Acceptance Individual)
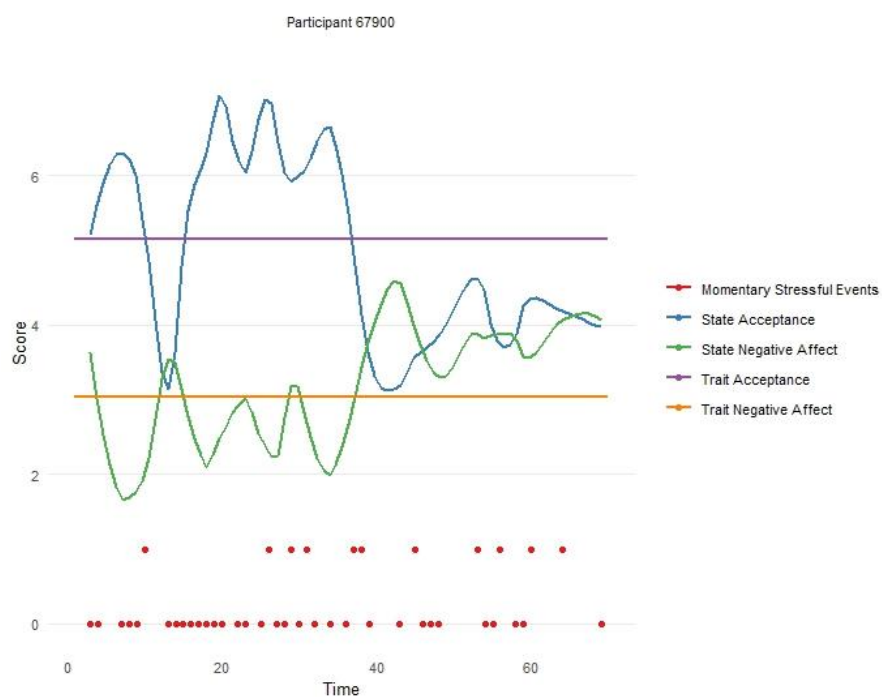

Individuals High in Trait Acceptance

As individuals high in trait acceptance, participants 67900 (*M*=5.15) and participant 62365 (*M*=6.65) were chosen (see Figures 3 and 4). Fluctuations in Participant 67900 (see Figure 3) illustrate that heightened state acceptance scores are associated with lower state negative affect scores (fluctuations between time points 20 to 40). Accordingly, lower state acceptance scores implicate higher state negative affect scores (see timepoint 40). While at some time points state negative affect seems to be slightly associated with momentary stressful events (see between time points 40 and 60), contradictory fluctuations show no association (see between time points 20 and 40). Interestingly, while both participants are attributed a high trait acceptance, individual fluctuations differ significantly in the line plotting (see Figures 3 and 4). Participant 62365 exhibits a stable high use of state acceptance, accompanied by very few fluctuations and low scores on state negative affect. The only significant fluctuations marked can be found on the left side of the x-axis (between timepoints 0 and 20), where fluctuations insinuate that heightened state acceptance is related to a decrease in state negative affect. Comparing the fluctuations of both participants, it can be assumed that the impact of stress in the interplay of state acceptance and negative affect can differ, state negative can be heightened without stressful events being present (see Figure 4).

Figure 3

Line Plot Visualising Fluctuations in Participant 67900 (High Trait Acceptance Individual)

Figure 4

Line Plot Visualising Fluctuations in Participant 62365 (High Trait Acceptance Individual)
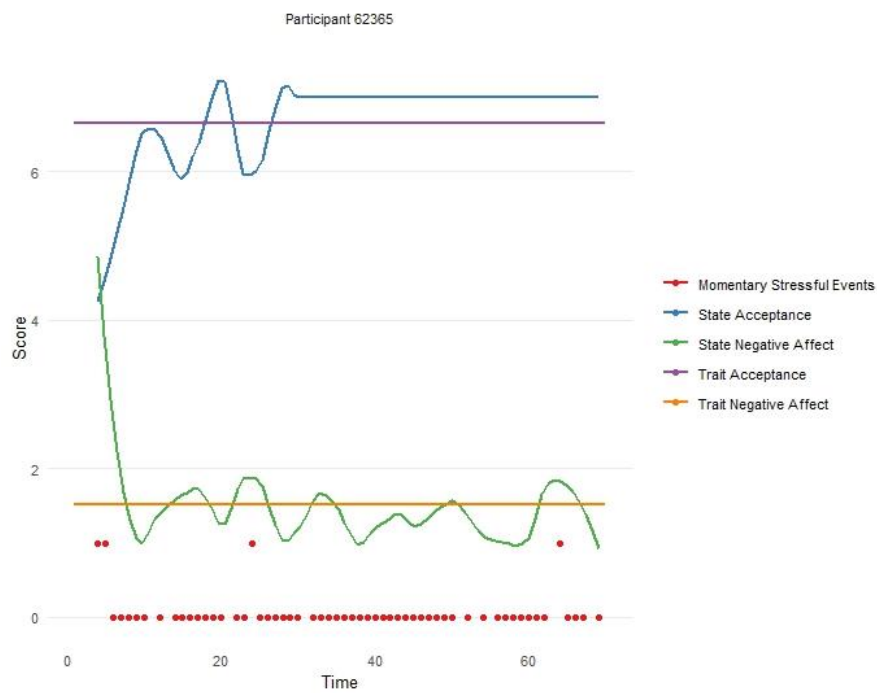
Discussion

This study investigated the dynamics between momentary stressful events, state negative affect, and the ER strategy acceptance in daily life using the experience sampling method (ESM). More specifically, the current study aimed to extend previous research by studying to what extent state acceptance and trait acceptance moderate affective stress reactivity in daily life.

When testing the moderation effect of state acceptance, the first finding of the current study revealed that momentary stressful events are associated with state negative affect (H1). This was hypothesised based on a large body of research as stress is known to be associated with negative affect and, more detrimentally, with adverse effects on mental health (e.g., DeLongis et al., 1988; Galderisi et al., 2015; Parrish et al., 2011). This finding was expected and aligned with previous research investigating stressful events and negative affect in cross-correlational and longitudinal study designs utilising ESM (e.g., Jacobs et al., 2007; Van Eck et al., 1998).

Secondly, it was investigated whether state acceptance moderates the relationship between momentary stressful events and state negative affect within individuals, which proved to be significant (H1). This hypothesis was led by evidence that acceptance is considered adaptive on the one hand and that ER flexibility is vital on the other. What proved essential in this study is the context-dependency of ER strategies whose functionality depends on the contextual demands such as stress that an individual faces (e.g., Aldao et al., 2015; Bonanno & Burton, 2013). The results insinuate that the interaction effect between state acceptance and momentary stressful events alleviates state negative affect in the context of stress in everyday life. This finding is in line with previously found effects in ESM studies which found state acceptance to reduce negative affect and stress symptoms, particularly in clinical populations (Shallcross et al., 2010; Tschacher & Lienhard, 2021), thereby further supporting its practicability in the context of stress.

Considering trait acceptance as a moderator for momentary stressful events and state negative affect (H2), no association was found. This aligns with what I hypothesised based on the priorly mentioned importance of contextual adaptation by a variable use of strategies instead of adhering to a rigid set of strategies (e.g., Aldao et al., 2015; Blanke et al., 2020; Bonanno & Burton, 2013). Although between-strategy variability, namely the interchanging use of multiple strategies, was not strictly tested, it can nevertheless be insinuated that in this sample, acceptance in the moment (as stated in H1) yielded an association with affective stress reactivity which trait acceptance failed to produce (H2). It could be concluded that in the context of stress,

it seems practical to use acceptance on a moment-to-moment basis instead of possessing an inherent tendency to use this strategy. This supports the notion of within-strategy variability as Aldao et al. (2015) stated, describing the variable use of single strategies in different contexts across time. As seen in the intraindividual fluctuations of participants in this study, the use of state acceptance fluctuates in situations of stress and feelings of negative affect. This suggests that individuals possibly adapt in which specific contexts they use the ER strategy of acceptance depending on the stressor and affect they face, as opposed to trait acceptance.

Exploring the intraindividual fluctuations revealed that state acceptance is a dynamic construct differing in use per individual. This was explored by closely investigating different participants' fluctuations scoring low or high on the measure of trait acceptance. While the plotted visualisations revealed that higher state acceptance scores are associated with lower state negative affect and vice versa, it was also shown that state acceptance and state negative affect fluctuate in unison at times. This insinuates that for specific individuals (in this case, participant 62680), more negative affect could be associated with more use of the strategy of acceptance in the moment to alleviate this affective state. Consequently, here acceptance could not prove effective, as it was not associated with a decrease in state negative affect. This supports the notion of between-strategy variability, suggesting that other ER strategies could have proven more adaptive in this situation. However, such interpretations should be considered cautiously, as they require a more thorough investigation.

Implications & Recommendations

The research at hand has provided outcomes that lead to different implications and future directions for research. This exploration of ER strategies in the context of affective stress reactivity showed how the different variables act simultaneously. However, causal effects cannot be inferred, and inferential models of the relationships between the constructs involved undermine the complexity of the interplay between the variables. Temporal precedence could be researched more closely to deepen the knowledge about the intertwined dynamics of ER strategies and affective states in stressful situations. As the intraindividual fluctuations in this study suggest, it is unclear to what extent state acceptance relates temporally to momentary stressful events and state negative affect. The concept of antecedent-focused ER implies that individuals apply strategies before an emotional response is elicited (e.g., reappraisal) and behaviour is impacted. In contrast, response-focused emotion regulation entails dealing with the emotion when it is emerging (e.g., suppression) (Gross & John, 2003). Acceptance is an ER strategy which can be designated to either of these categories (Liverant et al., 2008; Wolfgast et al., 2011). However, this lack of categorisation supports that there is research to be done to

unravel the underlying mechanisms of acceptance in the context of protecting mental health. Exemplary, experimental research designs allow to investigate temporal precedence, which could disclose whether state negative affect precedes state acceptance or vice versa.

Considering ER flexibility, this research provided evidence of some facets of its conceptualisation. The significant moderation effect of state acceptance and the non-significant effect of trait acceptance appear to illustrate the within-strategy variability and contextual importance of this strategy in stressful situations. However, another aspect of emotion regulation, namely between-strategy variability, was not measured within the scope of this study. While an emerging body of research emphasises how individuals deploy various strategies in different contexts (e.g., Aldao & Nolen-Hoeksema, 2012; Brockman et al., 2016; Blanke et al., 2020), it is unclear to what extent this approach can be integrated into an approach regarding some ER strategies to be more adaptive than others. Previous research underlined a lack of frameworks integrating these two paradigms (Sanchez-Lopez, 2021). Kraiss et al. (2020) suggest that while strategies cannot strictly be categorised into adaptive or maladaptive, sets of strategies that seem to be generally adaptive or maladaptive do appear to exist across several contexts. However, building an integrative framework combining both these approaches could foster an understanding of the adaptiveness of acceptance in different contexts which can be aimed for in the future.

While this study investigated the context of stress, where state acceptance seems to be an adaptive mechanism, considering other contexts could yield different results. In healthy individuals who find themselves in stressful situations, the acceptance approach can be adaptive if a stressor cannot be changed through problem-based strategies (Gratz & Tull, 2010). However, previous research underlines that applying acceptance might not lead to less psychological distress in mental illnesses such as post-traumatic stress disorder or generalised anxiety disorder (Salters-Pedneault et al., 2006; Shipherd & Salters-Pedneault, 2018). An ESM approach examining how acceptance fluctuates as an ER strategy in individuals with (past) mental illness such as post-traumatic stress disorder could provide information about its adaptiveness in clinically ill individuals (possibly acceptance could foster distress in such individuals).

Considering that state acceptance proved to alleviate the experienced negative affect in everyday contexts of stress, this yields possibilities for low trait acceptance individuals to learn the ability of acceptance. Despite trait acceptance not moderating affective responses in stressful situations, it nevertheless revealed information about the individual's general tendency to be accepting of their feelings and thoughts. While some individuals tend to be lower in

acceptance, applying state acceptance in specific moments proved adaptive in stress. To extend the existing body of acceptance and mindfulness-based approaches (Vøllestad et al., 2021; Wersebe et al., 2018), it could thus prove helpful to implement longitudinal interventions to foster the habitual use of acceptance in low acceptance individuals. This could further be combined with an ESM design, as it yields the possibility to examine the intraindividual change in fluctuations of the strategy use over an extended period.

Strengths & Limitations

Based on these findings, certain strengths and limitations of the current study can be formulated. Firstly, regarding the study design, this ESM study investigated within-person associations of acceptance, stress and negative affect in an ecologically valid manner and mirrors the mechanism of affective stress reactivity in people's everyday lives. Due to its high frequency of ten measurements per day and the semi-random sampling schedule, individuals responded spontaneously throughout the whole day. However, the study is characterised by a low response rate, which can be attributed to factors such as the high number of measurements and the high effort required from the participants.

Secondly, improvements are due regarding the psychometric properties of the state measurements. In a positive sense, the state scales derived from the ESM Item Repository proved to be reliable measurements considering the good split-half reliability coefficients. Furthermore, as the trait acceptance measurement was calculated based on the within-person measurements representing an individual's pattern of using this ER strategy in daily life, recall bias can be ruled out as an explanation (Blanke et al., 2020). However, as specific methods are required to assess the reliability and validity of these scales, there is a lack of reliable and valid measurements (see Kirtley et al., 2020). Considering the multilevel nature of such data, up to this day, no gold standard was defined to validate scales, especially considering frequently used one-item measures (see Eisele et al., 2021). Exemplary, convergent validity between trait acceptance based on state acceptance measurements (Kirtley et al., 2020) and trait acceptance measurements according to the validated CERQ scale (see Methods) proved to be non-significant in this study. It is thus imperative that the psychometric properties of such research instruments are adequately assessed to draw reliable and valid conclusions.

Thirdly, while in cross-sectional research reliable multifaceted instruments were developed to measure the ER strategy of acceptance (e.g., CERQ scale), few such instruments exist for ESM designs. In this study a one-item measurement of acceptance was used, measuring whether participants could let go of their negative thoughts and feelings without acting upon them (Kirtley et al., 2020). However, as other scales depict (see SERI-scale from Katz et al.,

2016), measuring acceptance is not only about letting thoughts go. Facets also include letting thoughts come up or enter the head, without acting on them which includes not changing them, avoiding them or delving into them. Therefore, a multifaceted instrument is needed to fully capture the essence of acceptance using methods of ecological momentary assessment.

Lastly, while non-probability sampling, specifically snowball and convenience sampling, can boast a few advantages, its disadvantages strongly outweigh its benefits. Despite the sample covering a broad age range and an even gender distribution, the sample is not representative of a general population due to its lack of diversity in educational level and nationality.

Conclusion

The present study found significant within-person associations of momentary stressful events and state negative affect, as well as a moderation effect of state acceptance on this relationship using ESM. It was also found that trait acceptance does not moderate the relationship between momentary stressful events and state negative affect. Both these findings support the importance of within-strategy variability and context-dependency of ER strategies in ER flexibility. Based on these findings, future research should emphasize both theoretical and practical approaches to disentangle the concepts of ER and ER flexibility. As a basis, theoretical frameworks can assist in developing effective interventions supporting healthy and clinically ill individuals in regulating their emotions variably and adaptively in everyday life, with or without acceptance.

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Appendix A

Baseline Questionnaires

Demographics

- Age: How old are you?

- Gender: What gender do you identify as? Male, female, other

- Nationality: What is your nationality? Dutch German Other

- Occupation: What is your current occupation? Student, Working, Self-employed, studying and working, not working, other

- Highest degree obtained: Middle school (such as MBO, MTS, MEAO or Haupt- oder Realschule), High school (such as HAVO, VWO, HBS or Gymnasium/ Berufsschule/ Berufskolleg), High school, Bachelor, Master, PhD, Other

Mental well-being (MHC-SF)

During the past month, how often did you feel...

1. Happy
2. Interested in life
3. Satisfied with life
4. That you had something important to contribute to society
5. That you belonged to a community
6. That our society is a good place or is becoming a better place, for all people
7. That people are basically good
8. That the way our society works makes sense to you
9. That you liked most parts of your personality
10. Good at managing the responsibilities of your daily life
11. That you had warm and trusting relationships with others
12. That you had experiences that challenged you to grow and become a better person
13. Confident to think or express your own ideas and opinions
14. That your life has a sense of direction or meaning to it

   a. Never
   b. Once or twice
   c. About once a week
   d. About 2 or 3 times a week
   e. Almost every day
   f. Every day

Anxiety (GAD-7)

Over the last two weeks, how often have you been bothered by the following problems?

1. Feeling nervous, anxious, or on edge
2. Not being able to stop or control worrying
3. Worrying too much about different things
4. Trouble relaxing
5. Being so restless that it is hard to sit still
6. Becoming easily annoyed or irritable
7. Feeling afraid, as if something awful might happen
    a. Not at all
    b. Several days
    c. More than half the days
    d. Nearly every day

Depression (PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems?

1. Little interest or pleasure in doing things
2. Feeling down, depressed, or hopeless
3. Trouble falling or staying asleep, or sleeping too much
4. Feeling tired or having little energy
5. Poor appetite or overeating
6. Feeling bad about yourself or that you are a failure or have let yourself or your family down
7. Trouble concentrating on things, such as reading the newspaper or watching television
8. Moving or speaking so slowly that other people could have noticed. Or the opposite being so fidgety or restless that you have been moving around a lot more than usual
9. Thoughts that you would be better off dead, or of hurting yourself
    a. Not at all
    b. Several days
    c. More than half the days
    d. Nearly every day

Trait Acceptance

1. I think that I have to accept that this has happened.

2. I think that I have to accept the situation.

3. I think that I cannot change anything about it.

4. I think I must learn to live with it.

Almost never

Rarely

Occasionally

Frequently

Almost always

Appendix B

State Questionnaires

State Negative Affect

Below you can find several questions about your current feelings. Please try to indicate how you felt right before you started to answer the questionnaire!

- How *anxious* do you feel right now?
- How *irritable* do you feel right now?
- How *down* do you feel right now?
- How *guilty* do you feel right now?
    - 1 (not at all) to 7 (very much)

Momentary Stressful Events

Think of the most striking event or activity in last hour. How (un)pleasant was this event or activity?

- -3 (very unpleasant) to +3 (very pleasant)

State Acceptance

In the last hour, I could let go of my negative thoughts and feelings without acting upon them

- 1 (not at all) to 7 (very much)

Appendix C

Informed Consent

Dear participant,

Thank you for your participation in this study.

Brief summary of project

The study is using the Experience Sampling Method (ESM) to obtain data. This means that 10 times a day there will be a prompt to answer a questionnaire containing about 20 items, which will take about 1 minute to complete. The questions regard your psychological well-being in the specific moment you are receiving the questionnaire and the time in-between questionnaires. It is important to fill out as many questionnaires as possible to ensure the success of the project.

To participate in this study, we need to ensure that you understand the nature of the research, as outlined in the participant information sheet. Please confirm at the bottom of the page to indicate that you understand and agree to the following conditions:

• I confirm that I have read the participant information sheet for this study. I have had the opportunity to consider the information, ask questions, and have had these answered satisfactorily.

• I understand that to take part in this study, I should

• Be at least 18 years old

• Possess a basic level of English

• I understand that personal data about me will be collected for the purposes of the research study including age, gender, nationality, level of education, current studies, and primary occupation, and this data will be processed completely anonymous and in accordance with data protection regulations.

• I understand that taking part in this study involves that I will be filling in 10 questionnaires every day for one week.

• I am voluntarily taking part in this research, and I know that I can stop the research at any time without giving any reason, without my rights being affected

• I don't expect to receive any benefit or payment for my participation.

• I understand that I am free to contact the researchers or supervisor with any questions I may have in the future.

- I understand that the data collected in this study will be anonymized, and only be used for academic purposes i.e., writing a thesis for the bachelor and/or master.
- I understand that personal data that will be collected within this study will not be shared with anyone other than the study team.
- I agree to take part in this study.

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee/domain Humanities & Social Sciences of the Faculty of Behavioural, Management and Social Sciences at the University of Twente by ethicscommittee-hss@utwente.nl